

TATA MOTORS

TATA MOTORS
EUROPEAN TECHNICAL CENTRE



Tata Motors is a leading global automobile manufacturer

Flagship
company of the Tata group

Home to **iconic brands**
'Jaguar' and 'Land Rover'

#1 CV
player in India


837,783
Sales Volume
(Consolidated excluding CJLR)

US\$ 33.3 Bn
revenue

12.2%
EBITDA Margin

125+
countries

75000+
employees



* figures as of FY21

PRIMARY BUSINESS VERTICALS



Commercial Vehicles (CV)



Passenger Vehicles (PV)



Luxury Vehicles

KEY SUBSIDIARIES

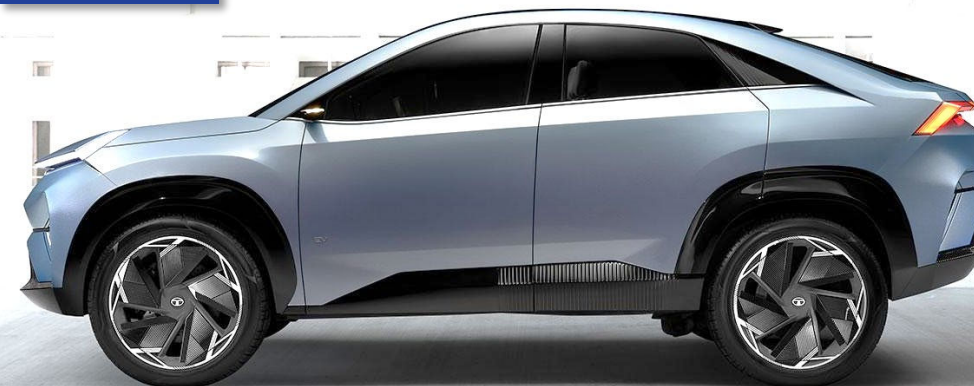


Tata Motors – Headed on an exciting journey into the future!

- Tata Motors is part of \$103bn Tata Group which has a presence in 100+ countries across Steel to Software and Automotive to Airlines
- Tata Group has a strong presence in the U.K. & owns brands like: Jaguar Land Rover, Tetley, Tata Steel (Corus), TCS etc. They are the 2nd largest private employer in U.K.
- Tata Motors is a leader in Passenger Electric vehicles in India and holds more than 70% market share effectively, competing with likes of Hyundai, Suzuki, Nissan & MG Motors
- Going forward, the company is betting big on the electric mobility and is planning to launch 10 new battery electric vehicles by 2025, with an investment of around US \$2bn
- Tata Motors European Technical Centre (TMETC) along with Tata Motors Global Design are based in the U.K. and are an important part of the future growth story



Tata CURVV



Exciting Future EV Products like the Tata CURVV under development

TMETC – Agile, Innovative & Future Driven

- Tata Motors European Technical Centre (TMETC) is based in Coventry and is perfectly situated in the heart of all the next-gen Mobility Research in the Midlands
- Has all the advantages of being a smaller organization, while still being part of a much larger parent company in India that has global aspirations
- The TMETC team is multi-cultural with talent from leading OEMs & Tier 1's. & has an agile Org. structure, giving it flexibility & speed of response to product development needs
- Tata Motors Global Design is also based out of the U.K. and spearheads all the next-generation projects, which the U.K. based Engineering & Attribute teams are able to support
- TMETC has been at the core of some of the most successful Tata Motors products over the years and is a key player in helping shape the future for Tata Motors

Tata NEXON



Tata ALTROZ

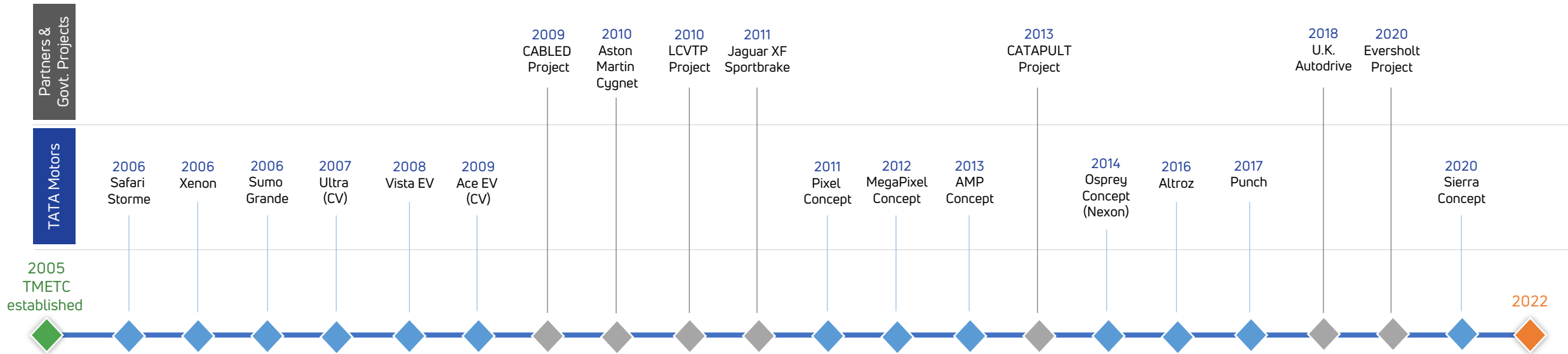


Tata PUNCH



TMETC is at the core of all future product development

Tata Motors European Technical Centre (TMETC) – Timeline



TMETC - Involved with EVs for over a decade now

TATA VISTA EV (2010)



TATA BOLT (2016) & ACE EV CONCEPTS (2013)



TATA TIAGO EV (2017)

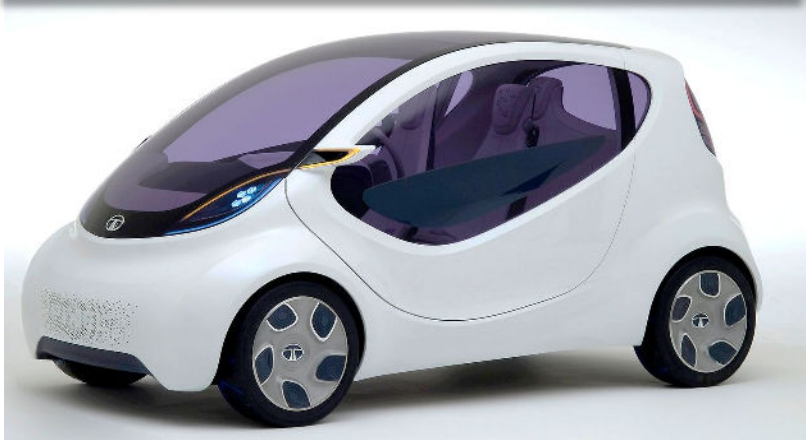
TMETC has been at the forefront of Technology & Innovation; from EVs a decade ago or an Autonomous Tata Hexa as part of the UK Autodrive project.



U.K. AUTODRIVE TATA HEXA (2017)

TMETC – Plays a critical role in realizing EV, NEV Aspirations

TATA PIXEL CONCEPT (2011 Geneva Motor Show)



TATA H2X CONCEPT (2019 Geneva Motor Show)



TATA SIERRA CONCEPT (2020 Auto Expo, India)



Tata Motors has always had an eye on EVs, with concepts from more than a decade ago pointing to the future of mobility. More recent concepts unveiled are now turning into reality in the EV Space.



TATA EVISION CONCEPT (2018 Geneva Motor Show)



TATA ALTRÖZ EV CONCEPT (2019 Geneva Motor Show)

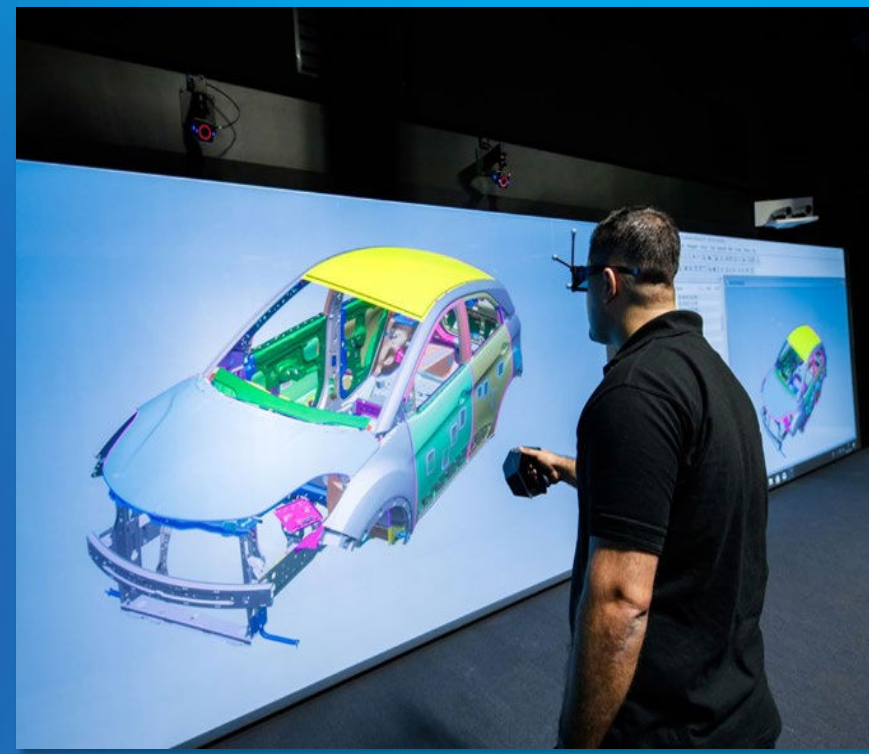


TATA NEXON EV LAUNCH (2020 Auto Expo, India)



TMETC is based at the National Automotive Innovation Centre

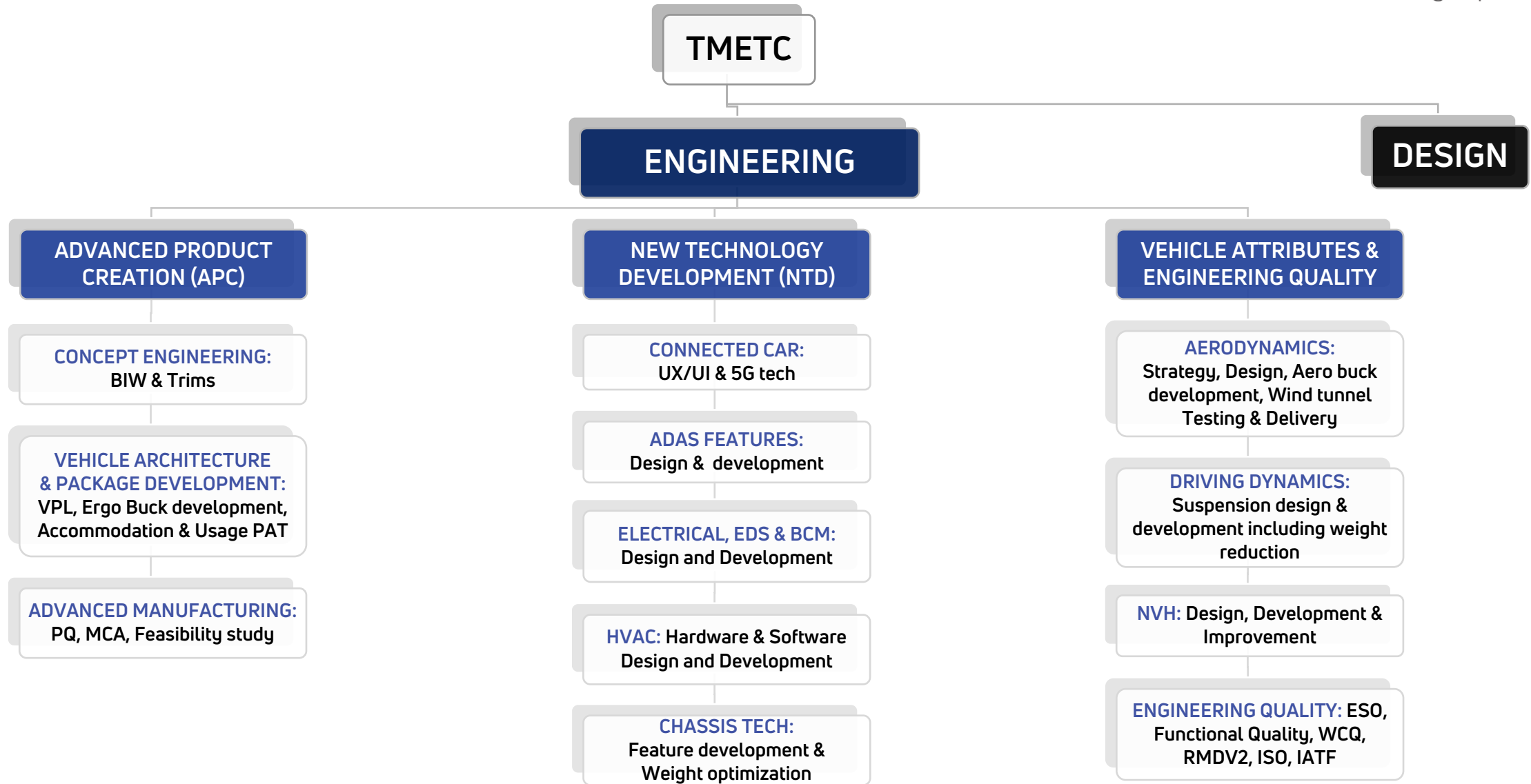
University of Warwick, Coventry



TMETC Competencies



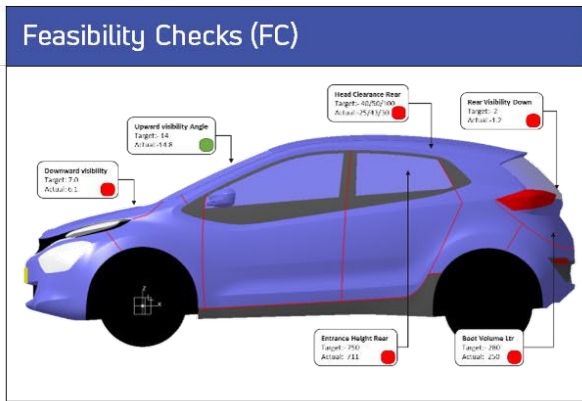
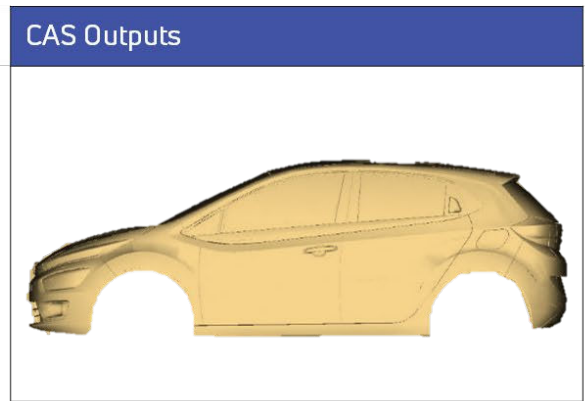
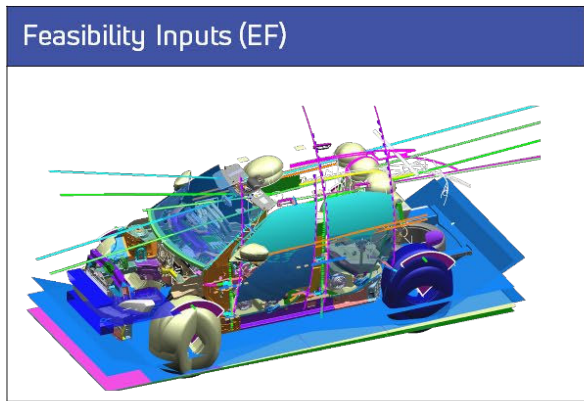
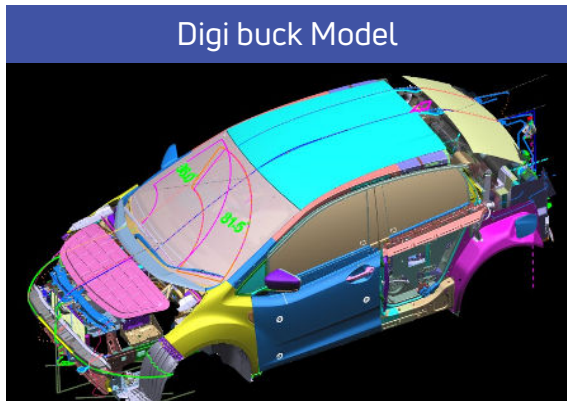
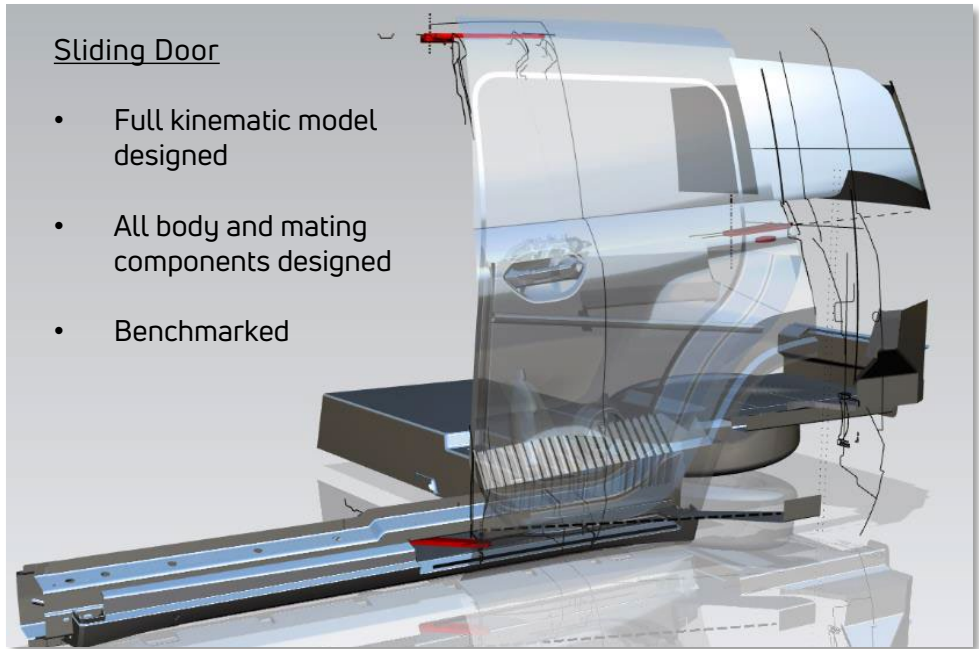
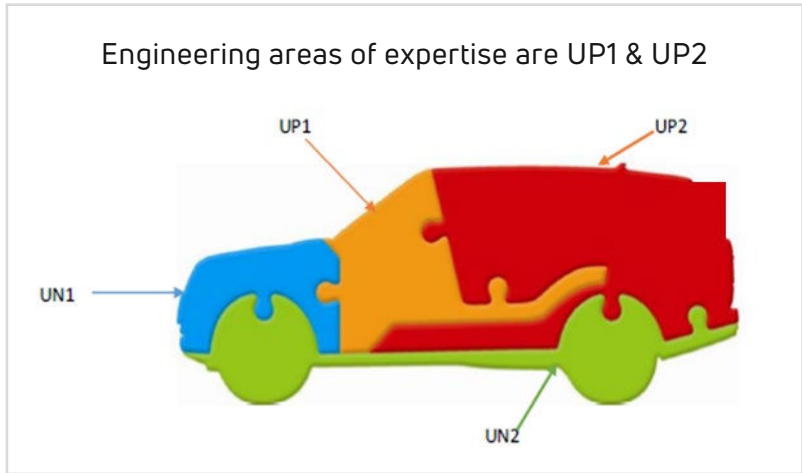
TMETC Competency Verticals

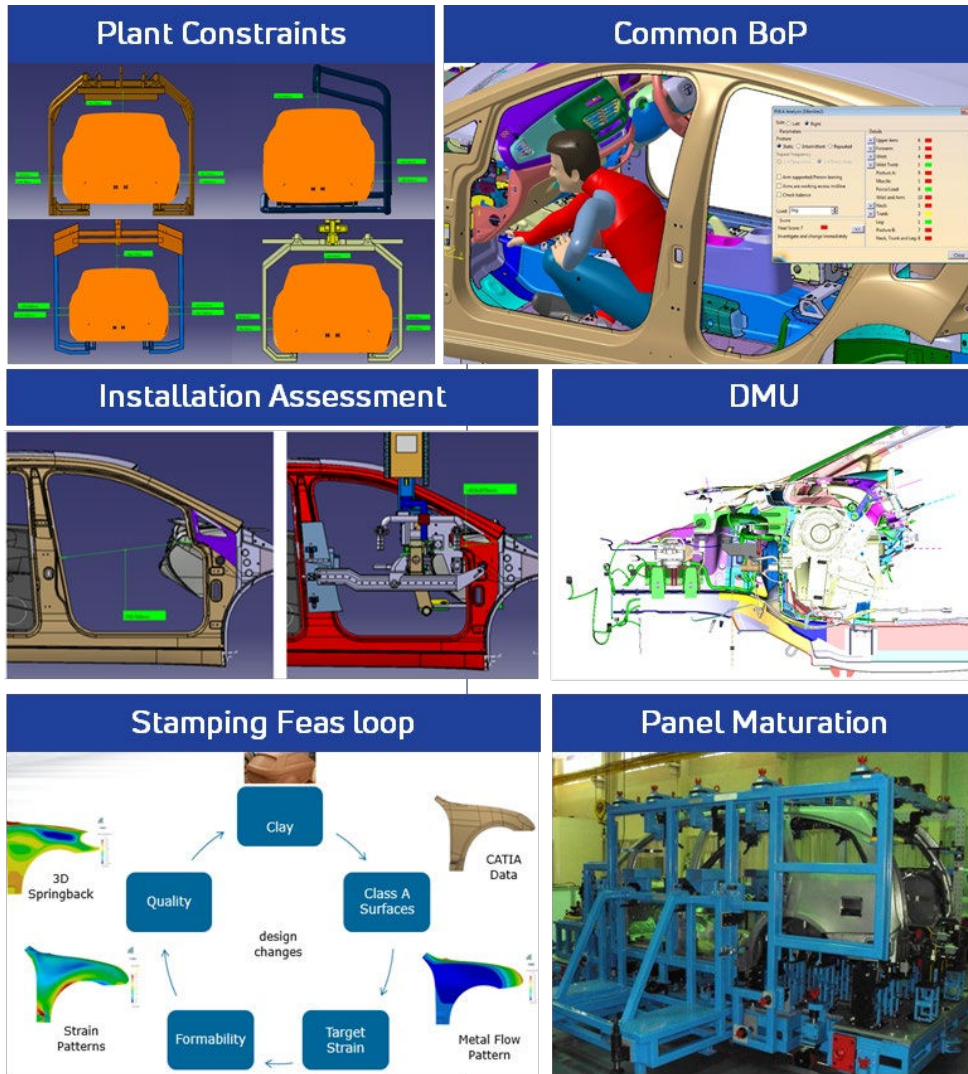


APC – Concept Engineering

- Concept feasibility studies
- Engineering Feasibility inputs to Design
- PMXU Studies
- Cost Packs, Cost Reviews
- Weight Studies / Reviews
- System feasibility studies
- System level what-if? studies
- Kinematic studies
- Hard-point Inputs
- FC Checks / FC Sign-off
- Supplier Liaison
- Support to Vehicle Integration Teams

For any new feature to be incorporated, a complete study of all the global benchmarks is done to arrive at an optimal solution.



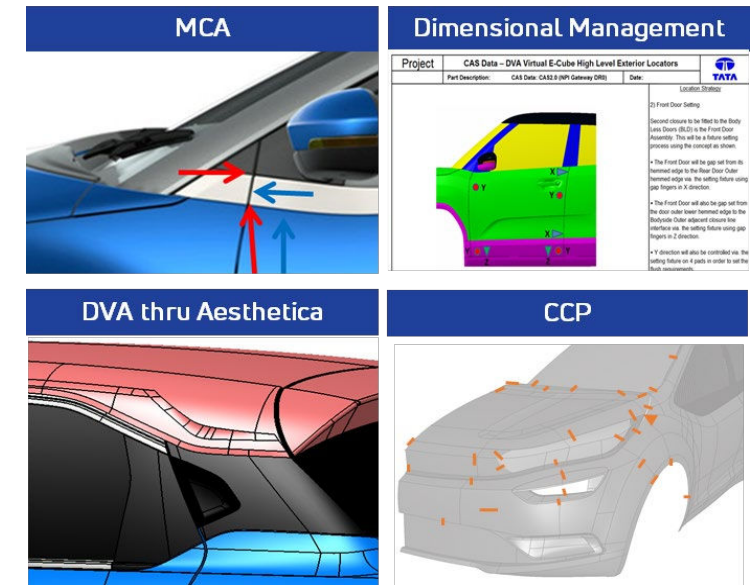


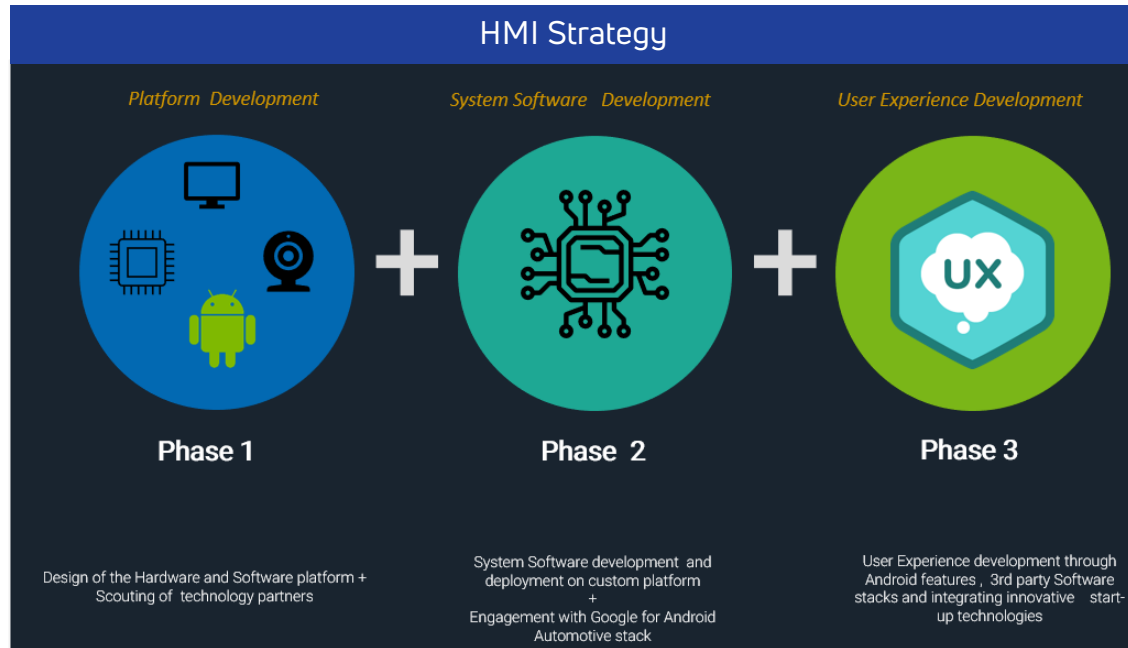
The TMETC AME team provide early stage manufacturing feasibility inputs from program Kick Off to ensure compliance & reduce Capex.

- Plant constraints – CAS level verification and inputs provided during early stage product development to minimise facility Capex
- Installation Assessment – Key product installations assessment done using correct plant resources to ensure minimal rework
- Common BoP – By providing BoP inputs at early stages using Delmia Human and Delmia DPM we ensure design compliance from the start
- Digital Mock Up (DMU) - DMU is a station by station build of a “vehicle” and is designed to ensure assembly issues are removed at a prototype / pilot build phase
- Stamping feasibility – The Team provides KPRs on behalf of Production Engineering who will then carry out DFM and any incremental work
- Panel Maturation – Ecube maturation and panel maturation on Blue buck to ensure achievement of PQ targets

DIGITAL TOOLS FOR DIMENSIONAL MANAGEMENT & PQ

- MCA (Manufacturing Complexity Analysis) – MCA takes away the subjective statement of ‘that looks complicated’ and adds quantifiable measurable system to reduce complexity in manufacturing by reviewing Gap control, Flush control and feature alignment digitally
- Dimensional Management – Define Part locator Strategies; CAD output to ensure synergy between DM, DVA and Engineering
- CCP (Coordinated cut plane) – Govern position of the Measurement points for PQ Gap Plan, DVA and CMM
- DVA (Dimensional variation analysis) – Using Aesthetica
- Dynamic Analysis of complex assembly

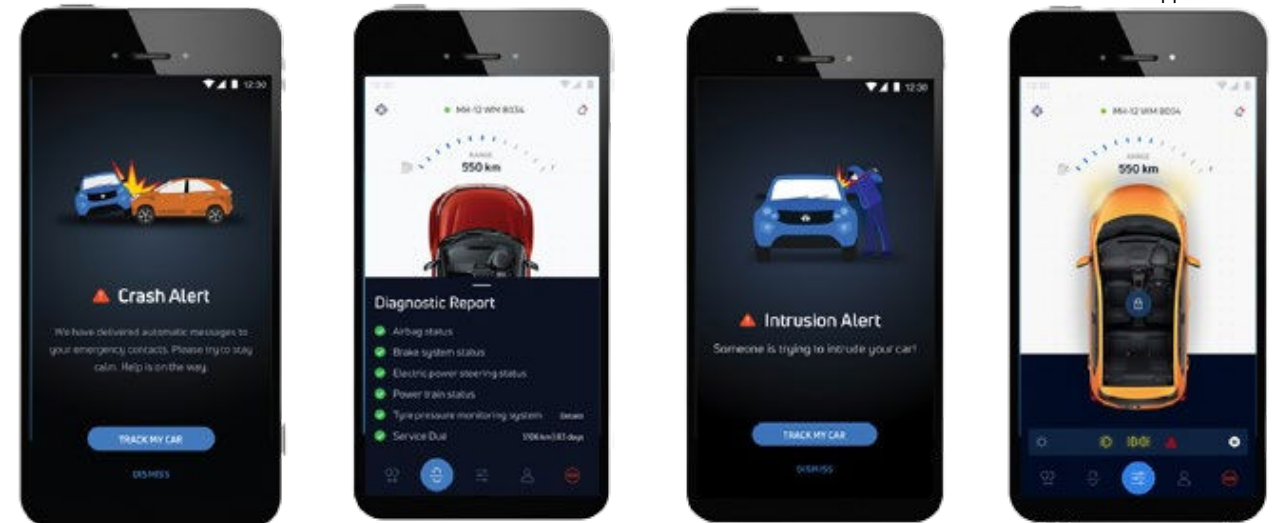


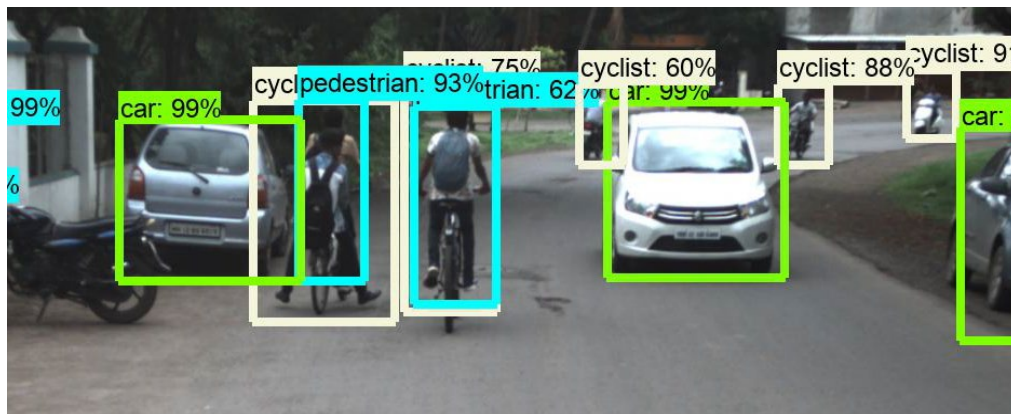
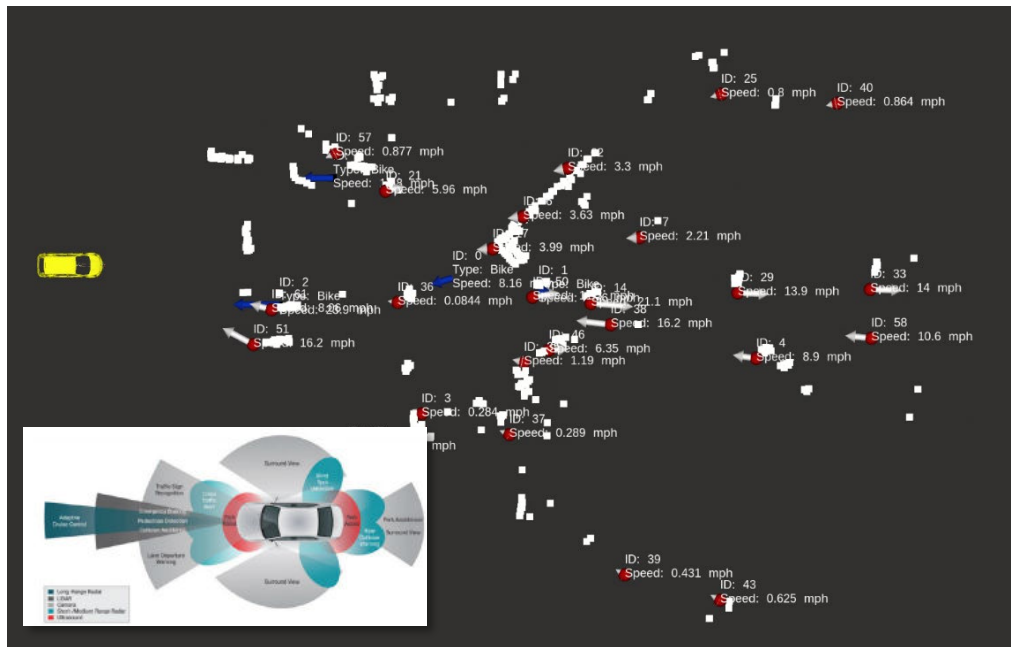


State of the art capability in the area of HMI, Speech, 5G & UX/UI

- HMI – Architecture development, Cockpit strategy, Aggregate selection, Partner identification and Development support. Feature addition including What3Words, Android Q, Alexa Auto, etc.
- Speech – Multi language voice recognition and solution integration to the current platform, Requirement definition, Liaising with multiple players including start-ups. Design and Development of Virtual personal assistant.
- 5G Readiness – Define application, Test criteria, Testing & validation. 5G modem integration
- UX/UI – Understanding user requirements, Screen-by-screen concept creation, Liaison with Styling and UI Design Teams for design and delivery.

TATA iRA Connected Car Application





AUTONOMOUS & ADAS

- In-house capability to develop Concept algorithm, Motion detection, Mapping techniques, Supervisory control development, Diagnostics, Autonomous Motion Planning System, Intelligent Robotics, etc.
- Ability to simulate Vehicle performance & Requirement Definition and management
- Grey box approach to help TML gain flexibility and develop bespoke features with minimal cost / capex
- Centralized Domain Control unit for faster and better decision making. Domain controller to have sensor processing, sensor data fusion and application algorithms
- TMETC UK Labs are equipped to do HIL, MIL, SIL validation
- Team has the experience of developing an Autonomous Vehicle (Tata Hexa) for government funded project UKAD
- Working as one global team with India teams to progress TMLs ADAS journey

AUTONOMOUS AND CONNECTIVITY LAB

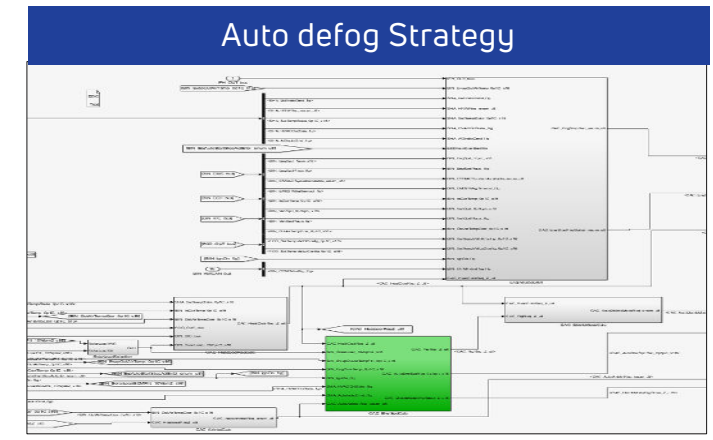
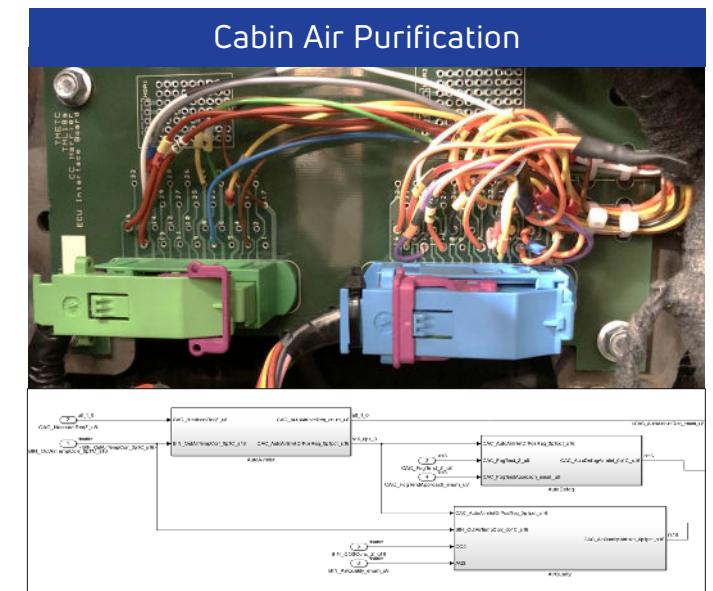
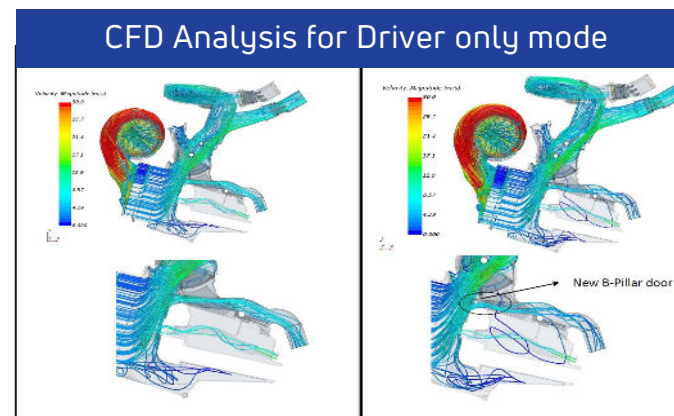
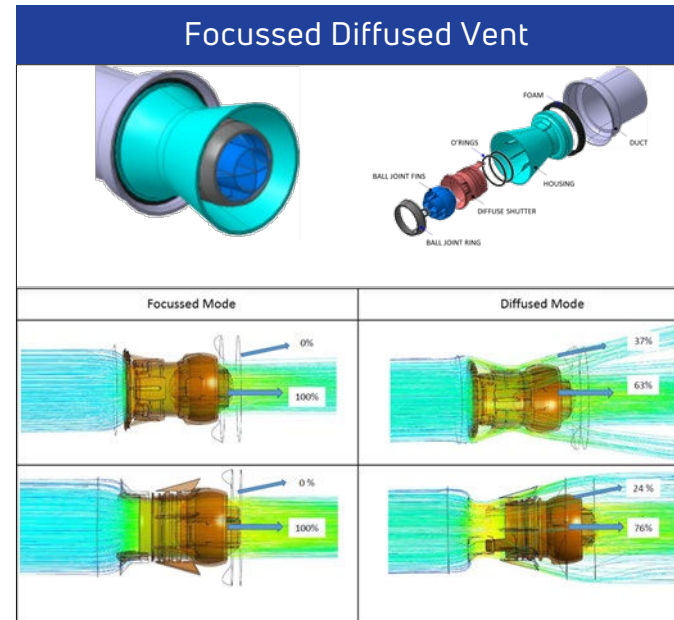
- HIL, SIL and DIL real-time simulator for autonomous and ADAS development and testing
- Deep learning machine for autonomous and ADAS development

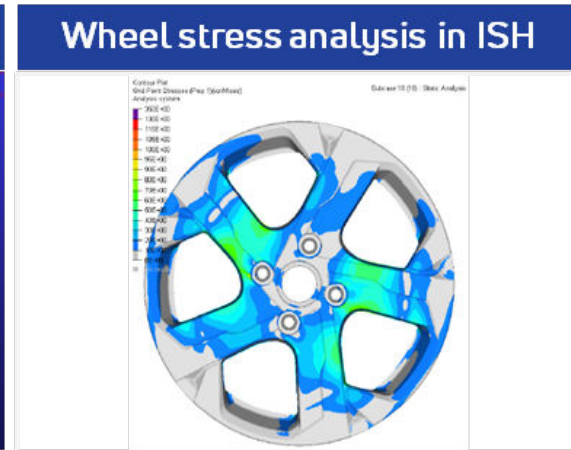
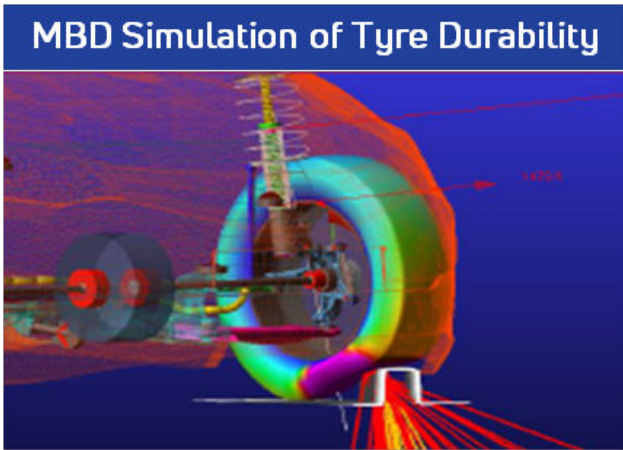


NTD – HVAC Systems

Capability includes HVAC Domain expertise as well as Software development and integration

- In-depth expertise to benchmark / conduct attribute futuring work & develop HVAC Technology road map
- Ability to Design and develop HVAC from ground-up based on Attribute futuring and vehicle architecture constraints
- Experience of developing hardware and software for FATC (Implemented in the Tata Altroz & Harrier)
- Ability to define & develop the Control strategy and Algorithm flow
- Ability to create demonstrators and validate
- New Feature Development: Focused Diffused vent, Driver only mode, Auto defog, Air purification, etc.
- Team holds the patent for Focused Diffused Vents which have wide application in both PV and CV cases.





CHASSIS SYSTEM DESIGN & OPTIMISATION

- Chassis light weighting:
Weight reduction projects for Subframe and Rear Twist Beam as an example
- Tyre durability:
Analysis and recommendations based on field failure of Tyres
- Variable ratio steering:
Design to optimize motor size of EPAS and thereby reducing cost
- Independent Steering Hub (ISH):
Design of a new kind of steering hub to improve platform flexibility to take on different tyre and wheel sizes based on market requirement with minimal change in platform

Variable Ratio Steering

Patent Apl No. : 201921043951

Chassis Light weighting

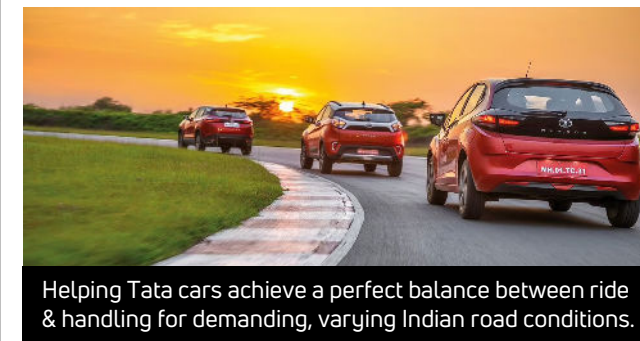
Free-Form Optimisation

Centre-section (Cross-section)

Constant section centre beam Optimisation

Centre-section (Cross-section)

Pre-set centre beam Optimisation

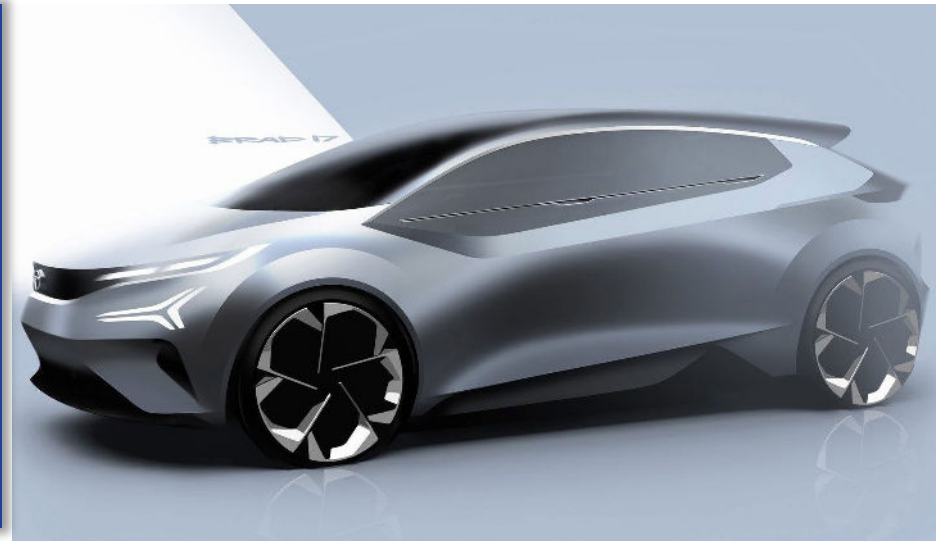




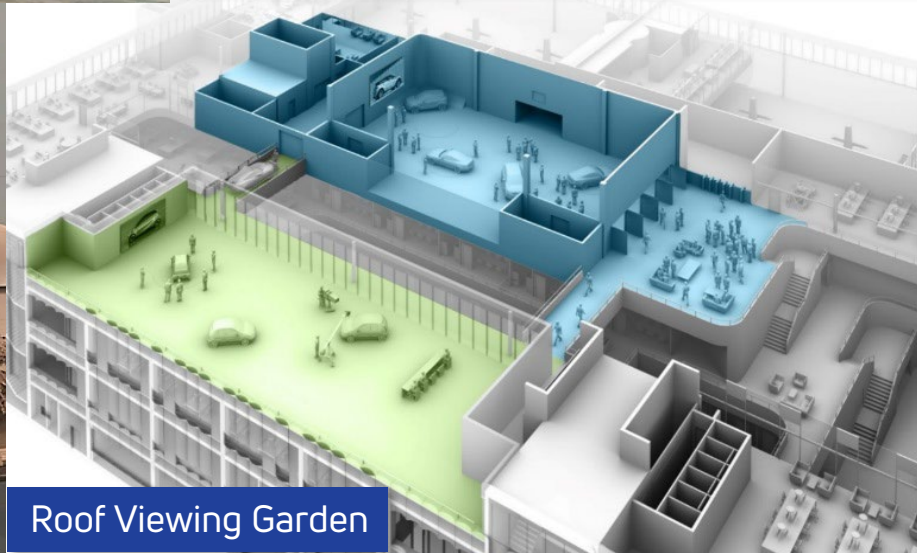
TATA Motors Global Design is headquartered in the UK at the NAIC building and works alongside the Design Studios in Italy and India.

It is home to Global Talent and the NAIC Studio has state of the art equipment:

Four 5-axis milling plates, Paintshop, wood-milling, rapid prototyping facility, Secure Viewing Showroom and a Roof Garden



5-Axis Milling Machines



Roof Viewing Garden



Vehicle Showroom

*Join us for an exciting journey
to a brighter tomorrow!*

TATA MOTORS
EUROPEAN TECHNICAL CENTRE



HRH Prince Charles is shown future TATA Motors products, during the inauguration of the National Automotive Innovation Centre – Feb 2020



HRH Prince Charles shaking hands with Ratan Tata, Chairman Emeritus of Tata Sons

